

Can Donor Coordination Solve the Aid Proliferation Problem?

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Abstract

The paper augments Holmstrom's (1982) team production model in the context of aid effectiveness. The analysis shows how donor proliferation leads to inefficient supply of aid in the recipient country because of the free-riding problem faced by the donors. The empirical

findings support the theoretical prediction with regard to donor proliferation. However, this raises the question whether the current efforts in the international aid community with regard to donor coordination can in fact solve the aid proliferation problem.

This paper—a product of the Regulatory Simplification Unit, Investment Climate Department—is part of a larger effort in the department to understand aid effectiveness. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The author may be contacted at arahman@ifc.org.

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Can Donor Coordination Solve the Aid Proliferation Problem?¹

by

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1. Introduction

Aid proliferation or “aid bombardment” is a growing concern among the international aid community and the aid recipients. Often, the presence of a large number of donors and projects overwhelm the recipient government’s capacity to manage and administer aid inflows. Consequently, the issue of donor coordination has become an important agenda in development policies. In this paper, we examine the inefficiency in aid supply due to donor proliferation, which in turn raises the question whether donor coordination can solve the aid proliferation problem.

Several recent studies address the issue of aid proliferation. Acharya et al. (2006) find that countries with the most acute fragmentation of aid inflows are very likely to receive aid from the worst proliferators among the donors. In such a situation, Knack and Rahman (2007) analyze the negative impact of donor fragmentation on the quality of government bureaucracy in aid recipient countries. Arimoto and Kono (2008) formalize the mechanism of competition over local matching funds through aid proliferation. In other words, aid proliferation induces competition over local experts or available local matching funds for aid and thus results in a decrease in the average bureaucratic quality and the effectiveness of aid projects, respectively, in the aid recipient countries. In addition, Roodman (2006) provides a theoretical argument on the proliferation of aid projects and the associated administrative burden for recipients. Generally speaking, aid proliferation increases the transaction costs for absorbing foreign aid that are incurred by the recipient governments; this results in a significant reduction in the effectiveness of aid (Acharya et al., 2006). To the best of our knowledge, no study has investigated the effect of aid proliferation on the performance of a recipient country, with the exception of Kimura et al. (2007).

This paper aims to theoretically bridge this gap by augmenting a standard team production model of Holmstrom (1982) in the context of aid effectiveness. The paper focuses

on the free-riding problem arising from the fact that aid outcomes in a recipient country are a combined result of a wide variety of resources that are provided by the donor and the recipient countries. Using this framework, we investigate whether donor coordination can solve the aid proliferation problem.

2. The Model

Consider the basic Holmstrom (1982) model to determine the amount of aid provided by donor countries to a recipient country. There are N donors, who jointly produce a single output, g , that is, for example, the aggregate economic growth of the recipient country. The amount of aid from the i -th donor is denoted by a_i . Therefore, the production technology or the economic growth function becomes: $g = g(a_1, a_2, a_3, \dots, a_N; X)$, where X is a matrix of variables that is specific to the recipient country. Let us assume that the utility function of a donor (agent) i is expressed as $u_i = s_i - a_i$, where s_i is the output share of donor i .² The efficiency regime of this economy can be solved as the following problem:

$$\underset{\{a_i\}}{\text{Max}} g(a_1, a_2, \dots, a_N; X) - \sum_{i=1}^N a_i. \quad (1)$$

The first-order condition (FOC) of this problem is:

$$\frac{\partial g}{\partial a_i} = 1. \quad (2)$$

Note that the Pareto optimal level of aid, a_i^* , satisfies this FOC. On the other hand, a Nash equilibrium is derived by solving an individual donor's utility maximization:

$$\underset{\{a_i\}}{\text{Max}} s_i(g) - a_i, \quad (3)$$

² Alternatively, we can employ a general convex disutility function from aid provision, denoted by $v_i(a_i)$. Such a generalization will not change the qualitative results.

given the technology in equation (1). The FOC is:

$$\frac{\partial s_i}{\partial g} \frac{\partial g}{\partial a_i} = 1, \quad (4)$$

where $\frac{\partial s_i}{\partial g}$ is a private benefit from enhancing economic growth and $\frac{\partial g}{\partial a_i}$ is the growth effect of aid or “aid effectiveness” of Burnside and Dollar (2000). Equation (4) gives an individually optimal aid level, \hat{a}_i . The main question is whether the joint outcome g can be fully allocated in a manner such that the resulting non-cooperative game among the agents has a Pareto optimal Nash equilibrium. This requires the discovery of an allocation rule s_i that satisfies both the Pareto optimality condition in (2) and the Nash equilibrium condition in (4). Mathematically, we need to show the feasibility of

$$\frac{\partial s_i}{\partial g} = 1, \forall i. \quad (5)$$

This feasibility depends on the characteristics of the output, g . If, for example, we assume that the individual donors’ benefit from aid effectiveness is private goods,³ equation (5) is infeasible,

because by differentiating the balanced budget condition, i.e., $\sum_1^N s_i = g$, we have:

$$\sum_{i=1}^N \frac{\partial s_i}{\partial g} = 1. \quad (6)$$

It is evident that the requirement of the Pareto optimal Nash equilibrium in (5) and the balanced budget condition in (6) contradict each other if $N > 1$. At the Nash equilibrium, an agent’s effort level, \hat{a} , is smaller than the social optimal, a_i^* . This result indicates that in a situation where selfish donors compete among themselves, free-rider problems are likely to lead to an insufficient supply of foreign aid.

³ This may apply when donors care about their relative political influence on a recipient country.

On the other hand, if there is only one donor, i.e., $N = 1$, equations (5) and (6) hold simultaneously. However, as N increases, the gap between the Pareto optimal effort level and the individually optimal effort level widens. This result illustrates the inefficiency of aid proliferation.

In contrast, when donors are fully altruistic and the aid effectiveness translates into pure public goods, the individual solution becomes socially optimal. In other words, the free-rider problem arises when there are multiple donors who are motivated by self-interest.

3. Empirical Results

Empirically, we examine the free-rider problem by estimating the following equation:

$$\sigma_{it} = f(N_{it}) + X_{it}\beta + u_i + \varepsilon_{it}, \quad (7)$$

where σ_{it} is a proxy for the variable, s_i , which is quantified by the average aid per donor as a share of the recipient's GDP in country i in year t , and N , as before, is the number of donor agencies in the recipient country. X is a vector of country specific controls, such as GDP per capita and population size. The last two terms in the right-hand side of equation (7) are the country fixed effects and a well-behaved error term, respectively.

With regard to the data sources, we employ the Creditor Reporting System (CRS) database of the Organization for Economic Cooperation and Development (OECD) to compute the average aid per donor. The CRS provides detailed information on every activity funded by the foreign aid provided by member countries of the OECD or the OECD's Development Assistance Committee (DAC). To calculate the aid variable for each recipient, we use the committed amount of bilateral and multilateral foreign aid. Other macroeconomic data, such as GDP per capita and population size, were extracted from the Penn World Table Mark 6.2 (Heston, Summers, and Aten, 2006). We use a cross-country data set of 163 countries for the

period 2000–2003.

We first estimate (7) by assuming that the function, $f(\cdot)$ is a linear function. We employ linear OLS and fixed effect estimators, both in the presence and absence of control variables (see Table 1). While the OLS estimate yields insignificant coefficients for the number of donors N , after we control for country fixed effects, we obtain negative and statistically significant coefficients on N . This result is consistent with the prediction of our theory in which the individual donors' benefit from aid effectiveness is private goods. The sample mean of the aid per donor as a share of GDP is about 2.5 percent and the average number of donors is 16. Hence, having an additional donor leads to a 0.7 percent reduction in the mean aid per donor share in the recipient country.

In order to test the robustness against the linearity assumption, we also estimate equation (7) semi-parametrically with country fixed effects. The results of the non-parametric and parametric parts are reported in Figure 1 and specification (5) of Table 1, respectively. As is evident from Figure 1, the non-parametric regression line has a negative slope.⁴ These findings are consistent with the free-rider mechanism described in Section 2.

4. Concluding Remarks

In this paper, we first augment Holmstrom's (1982) team production model in the context of aid effectiveness. We theoretically demonstrate how donor proliferation leads to inefficient aid supply in the recipient country because of the free-riding problem faced by the donors. Our empirical findings support our theoretical prediction. This in turn raises the question whether the current efforts with regard to donor coordination in the international aid community can actually solve the aid proliferation problem. Since the free-rider problem

⁴ In order to estimate Equation (9), we use Lokshin's (2006) algorithm, which is based on the differencing method in the estimation of partial linear models introduced by Yatchew (1997). The shape of the function is similar when we introduce linear controls, namely, the recipient's GDP per capita and population.

arises due to the presence of multiple donors who are motivated by self-interest, the mere coordination of aid, such as general budget supports, will not automatically guarantee the sub-optimality of aid provisions unless there is a fundamental change in the incentives for aid provisions.

In the spirit of the Holmstrom (1982) model, the principal can eliminate moral hazards by administering incentive schemes that do not balance the budget. For example, a contract under which all donors receive $g(a^*)$ if $g = g(a^*)$, and receive nothing if $g < g(a^*)$. A feasible scheme should be based on a recipient-specific evaluation of the donors' performance. The operationalization of such a contract would be an important task for the future.

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Table 1.**Aid Proliferation Regression**

Dependent variable: Aid per donor as a share of GDP

Estimation method	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	Fixed Effects	Fixed Effects	Semi-parametric Fixed Effects
Number of donors	0.001 (0.001)	0.001 (0.001)	−0.007** (0.003)	−0.007** (0.003)	(See Figure 1)
Real GDP per capita (in thousand USD)		−0.010** (0.004)		−0.017*** (0.006)	−0.012 (0.009)
Population size (in million people)		−10.066*** (2.892)		−11.301 (10.913)	−14.650 (11.424)
Constant	0.011 (0.017)	0.099*** (0.037)	0.138** (0.054)	0.264*** (0.080)	
No. of Observations	652	652	652	652	651
Number of Recipients	163	163	163	163	163

Note: Standard errors in parentheses. * significant at 10%; ** significant at 5%; and *** significant at 1%.

